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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

FLETCHER III, WILLIAM P

ART UNIT	PAPER NUMBER
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1762

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DATE MAILED: 05/07/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/739,087

Applicant(s)

SHAIKH ET AL.

Examiner

William P. Fletcher III

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 December 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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Detailed Office Action

I. Form & Content of the Application

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Title

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

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Specification

The specification is objected to for containing the following apparent typographical errors:

p. 2, l. 20 "he" should apparently read "the;"

15

p. 13, l. 14 "0'" should apparently read "0°."

Appropriate correction is required.

Drawings

The drawings are objected to as failing to comply with 37
20 CFR 1.84(p)(4) because reference characters **2** and **10** appear to have both been used to designate the same part in Fig. 1. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the

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application. The objection to the drawings will not be held in abeyance.

II. Rejections under 35 U.S.C. § 103

5

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

10 (a) A patent may not be obtained though the invention is not
identically disclosed or described as set forth in section 102 of
this title, if the differences between the subject matter sought
to be patented and the prior art are such that the subject matter
as a whole would have been obvious at the time the invention was
15 made to a person having ordinary skill in the art to which said
subject matter pertains. Patentability shall not be negated by
the manner in which the invention was made.

> **Claim 1** is rejected under 35 U.S.C. § 103(a) as being
unpatentable over Palazzolo et al. {US 5,691,004} in view of
20 Alkhimov et al. {US 5,302,414}.

Palazzolo et al. teach a process of lining a cylinder bore
of an aluminum engine block in which the cylinder bore is
sprayed with a lining material of various metals that are
25 different from the material of the engine block [abstract]. The
lining material is applied by thermal spraying [abstract]. This

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thermal spraying may be carried out by a powder plasma technique [c. 4, ll. 55 - 56].

Palazzolo et al. do not teach that lining material is applied using a gas-dynamic cold spray.

5 Alkhimov et al. teach a cold gas-dynamic spraying process for applying a coating to an article [abstract]. This process directs a jet of powder of a metal, alloy, or a mechanical mixture of a metal and an alloy, against an article to deposit the coating [abstract].

10 Alkhimov et al. teach that their cold gas-dynamic spraying process eliminates damage to the substrate and poor coating characteristics associated with powder plasma thermal spraying techniques [c. 1, l. 44 - c. 4, l. 5].

Because both Palazzolo et al. and Alkhimov et al. teach the
15 spray application of powders of metals and/or alloys to substrates, and because Alkhimov et al. teach that their cold gas-dynamic spraying process is superior to powder plasma thermal spraying, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify
20 the process of Palazzolo et al. so as to deposit the lining material by the cold gas-dynamic spraying technique of Alkhimov et al. One of ordinary skill in the art would have been motivated by the expectation of successfully depositing the

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lining material of superior quality without damaging the cylinder bore.

> **Claim 2** is rejected under 35 U.S.C. § 103(a) as being
5 unpatentable over Palazzolo et al. {US 5,691,004} in view of
Alkhimov et al. {US 5,302,414} as applied to claim 1 above, in
further view of Shepard {US 2,588,422}.

Palazzolo et al. teach the limitations of this claim
10 described above. Palazzolo et al. further teach that their
process coats the cylinder bore with a first and a second lining
material [abstract]. The first lining material may be 95%
bronze [c. 4, ll. 50 - 54]. Bronze is an alloy of copper. The
second lining material is ferritic stainless steel mixed with
15 nickel-encapsulated boron nitride [c. 5, ll. 8 - 15].

Palazzolo et al. do not explicitly state that the second
material has a heat transfer resistance that is greater than the
first material.

Shepard teach a process similar to that of Palazzolo et al.
20 in which a first and second lining material are thermal spray-
applied to an aluminum cylinder bore [c. 6, Example]. More
specifically, they teach that where a particular wear- and

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corrosion-resistance are desired, stainless steel may be the second lining material [c. 5, ll. 23 - 27].

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the process of Palazzolo et al. in view of Alkhimov et al. so as to apply, as the second lining material, stainless steel. One of ordinary skill in the art would have been motivated do so by the expectation of successfully depositing a wear- and corrosion-resistant lining material.

The applicants, on p. 6, l. 14 - p. 7, l. 15 of the specification, disclose that a suitable combination of first and second material layers, in which the second material layer has a higher heat transfer resistance than the first material layer, is a copper alloy as the first material layer and stainless steel as the second material layer. Therefore, it is the examiner's position that Palazzolo et al. in view of Alkhimov et al., in further view of Shepard, teach coating the cylinder bore with two material layers, with the heat transfer resistance of the second material layer being greater than that of the first material layer.

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> **Claim 3** is rejected under 35 U.S.C. § 103(a) as being unpatentable over Palazzolo et al. {US 5,691,004} in view of Alkhimov et al. {US 5,302,414}.

5 Palazzolo et al. in view of Alkhimov et al. teach all of the limitations of this claim described above. Palazzolo et al. further teach that their process coats the cylinder bore with a first and a second lining material [abstract]. The first lining material may be 95% bronze [c. 4, ll. 50 - 54]. Bronze is an
10 alloy of copper. The second lining material is ferritic stainless steel mixed with nickel-encapsulated boron nitride [c. 5, ll. 8 - 15].

Palazzolo et al. do not explicitly state that the adhesion of the first material layer to the aluminum engine block is
15 greater than that of the second material layer, or that the material hardness of the second material layer is greater than that of the first material layer.

Nevertheless, Palazzolo et al. teach that the first material layer is coated as a bond coat because of its
20 metallurgical affinity for the substrate [c. 4, ll. 50 - 54]. It is the examiner's position that, in the process of Palazzolo et al., the first material layer inherently has a greater

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adhesion to the aluminum engine block as attested to by it's being used as a bond coat.

Further, bronze is a soft alloy, certainly softer than ferritic stainless steel mixed with nickel-encapsulated boron
5 nitride. It is the examiner's position that Palazzolo et al. also, therefore, teach that the material hardness of the second lining material is greater than that of the first.

> **Claim 3** is rejected under 35 U.S.C. § 103(a) as being
10 unpatentable over Palazzolo et al. {US 5,691,004} in view of Alkhimov et al. {US 5,302,414}, as applied to claim 1 above, in further view of Shepard {US 2,588,422}.

Palazzolo et al. in view of Alkhimov et al. teach the
15 limitations of this claim described above. Palazzolo et al. further teach that their process coats the cylinder bore with a first and a second lining material [abstract]. The first lining material may be 95% bronze [c. 4, ll. 50 - 54]. Bronze is an alloy of copper. The second lining material is ferritic
20 stainless steel mixed with nickel-encapsulated boron nitride [c. 5, ll. 8 - 15].

Palazzolo et al. do not explicitly state that the adhesion of the first material layer to the aluminum engine block is

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greater than that of the second material layer, or that the material hardness of the second material layer is greater than that of the first material layer.

Shepard teach a process similar to that of Palazzolo et al. in which a first and second lining material are thermal spray-applied to an aluminum cylinder bore [c. 6, Example]. More specifically, they teach that where a particular wear- and corrosion-resistance are desired, stainless steel may be the second lining material [c. 5, ll. 23 - 27].

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the process of Palazzolo et al. in view of Alkhimov et al. so as to apply, as the second lining material, stainless steel. One of ordinary skill in the art would have been motivated to do so by the expectation of successfully depositing a wear- and corrosion-resistant lining material.

The applicants, on p. 6, l. 14 - p. 7, l. 15 of the specification, disclose that a suitable combination of first and second material layers, in which the first material layer has a greater adhesion to the aluminum engine block than the second material layer, and the second material layer has a greater material hardness than the first material layer, is a copper alloy as the first material layer and stainless steel as the

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second material layer. Therefore, it is the examiner's position that Palazzolo et al. in view of Alkhimov et al., in further view of Shepard, teach coating the cylinder bore with two material layers, with the adhesion of the first material layer to the aluminum engine block greater than the second material layer, and the material hardness of the second material layer greater than the first material layer.

> **Claim 4** is rejected under 35 U.S.C. § 103(a) as being unpatentable over Palazzolo et al. {US 5,691,004} in view of Alkhimov et al. {US 5,302,414}, in further view of Shepard {US 2,588,422}.

Palazzolo et al., in view of Alkhimov et al., in further view of Shepard, teach the limitations of this claim described above.

Palazzolo et al. do not explicitly state that the adhesion of the first material layer to the aluminum engine block is greater than that of the second material layer, or that the material hardness of the second material layer is greater than that of the first material layer.

The applicants, on p. 6, l. 14 - p. 7, l. 15 of the specification, disclose that a suitable combination of first and

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second material layers, in which the first material layer has a greater adhesion to the aluminum engine block than the second material layer, and the second material layer has a greater material hardness than the first material layer, is a copper alloy as the first material layer and stainless steel as the second material layer. Therefore, it is the examiner's position that Palazzolo et al. in view of Alkhimov et al., in further view of Shepard, teach coating the cylinder bore with two material layers, with the adhesion of the first material layer to the aluminum engine block greater than the second material layer, and the material hardness of the second material layer greater than the first material layer.

> **Claims 5 - 9** are rejected under 35 U.S.C. § 103(a) as being unpatentable over Palazzolo et al. {US 5,691,004} in view of Alkhimov et al. {US 5,302,414}, as applied to claim 1 above, in further view of Shepard {US 2,588,422}.

Palazzolo et al. in view of Alkhimov et al. teach the limitations of these claims described above.

Palazzolo et al. in view of Alkhimov et al. do not teach: with respect to claim 5, that the lining material is sprayed through a nozzle and that the nozzle and engine block have

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relative movement with respect to one another; with respect to claim 6, that the nozzle is translated up and down through the cylinder bore; with respect to claim 7, that the nozzle is position along a longitudinal center axis of said cylinder bore; with respect to claim 8, that the nozzle is angled at 30°, plus or minus 15°, from a surface of said cylinder bore; and, with respect to claim 9, that the cylinder bore is coated in multiple passes.

Shepard teaches a process similar to that of Palazzolo et al. in which lining material is applied to an aluminum cylinder bore by thermal spraying [see above]. The spray nozzle is advanced co-axially into the cylinder, and the nozzle sprays at an angle of approximately 40° [c. 6, Example]. The desired thickness may be applied in more than one pass [c. 6, Example].

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the process of Palazzolo et al. in view of Alkhimov et al. so as to apply the lining material according to the process of Shepard described above. One of ordinary skill in the art would have been modified by the expectation of similar results – namely, successfully coating the cylinders with the lining material.

The nozzle angle of 40° taught by Shepard falls within the claimed range of 30° ± 15°. Further, it is the examiner's

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position that modifications necessary to the apparatus of Alkhimov et al., such as those required to angle the nozzle to spray at approximately 40°, would have been well-within the level of skill of one of ordinary skill in the art.

5

III. Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William
10 P. Fletcher III whose telephone number is (703) 308-7956. The examiner can normally be reached on Monday through Thursday, 7 AM to 5 PM, Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be
15 reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status
20 of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

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William Phillip Fletcher III
Patent Examiner
United States Patent & Trademark Office
Group Art Unit 1762

wpf

May 1, 2002

A handwritten signature in black ink, appearing to read 'Shrive P. Beck', with a long horizontal flourish extending to the right.

SHRIVE P. BECK
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700